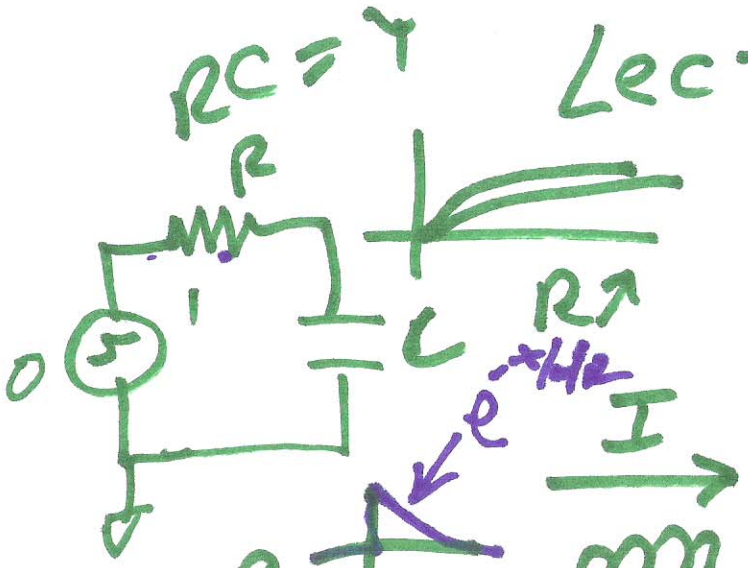
# Lecture 17

EE 220

July 2, 2014



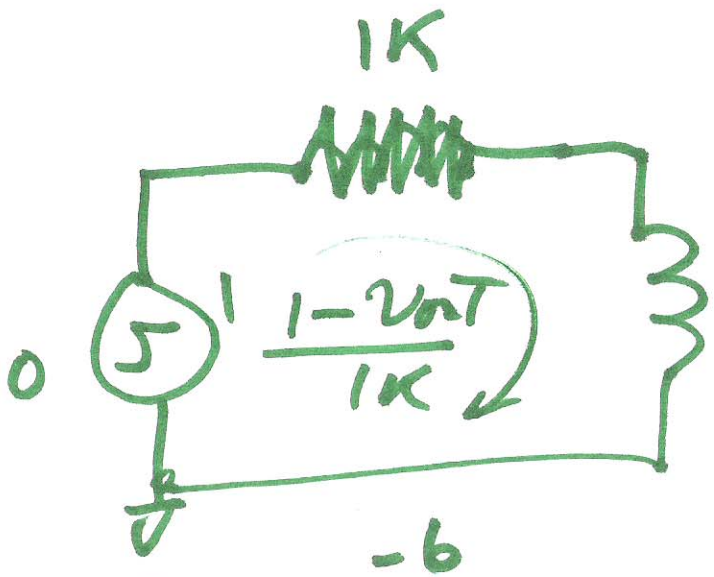

$V = L\frac{dI}{dt}$

$I = \frac{1}{L}\int V\,dt$

$I \cdot j\omega L = V$

$T = L/R$

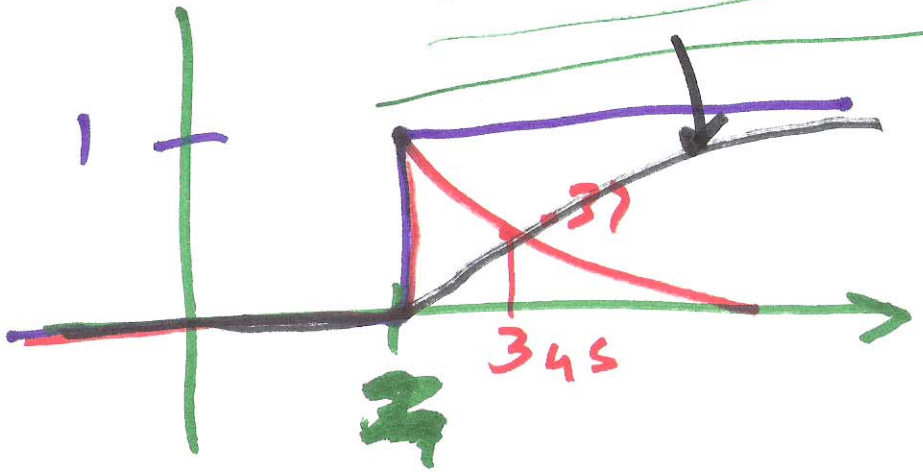
$\frac{1}{2} L I^2$

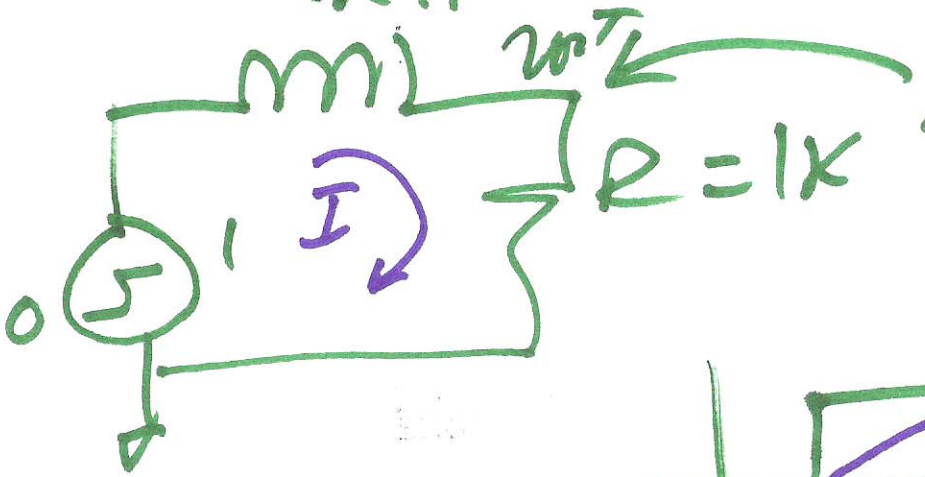



$$\tau = L/R = 10^{-6}\ \text{s} = 1\ \mu\text{s}$$

$$v_0(t) = 1 \cdot e^{-t/(L/R)}$$

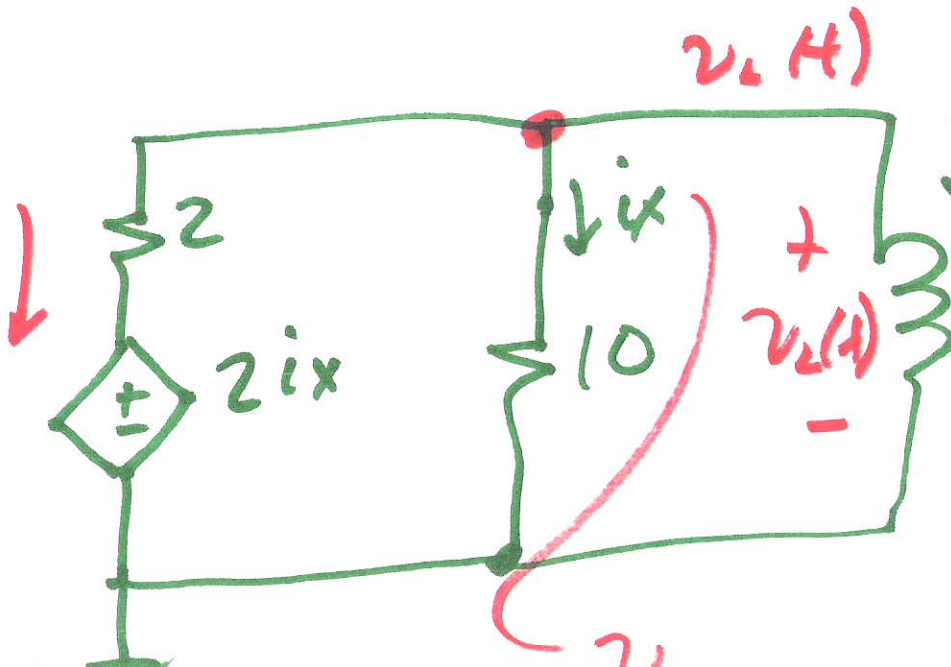
$$i(t) = \frac{1}{1K}\left(1 - e^{-t/\tau}\right)$$




$$v_{RT} = 1\left(1 - e^{-t/L/R}\right)$$

$$I = \frac{1}{1K}\left(1 - e^{-t/L/R}\right)$$




$i_L(0^-) = 25A$

$$i_L + \frac{v_L(t)}{10} + \frac{v_L(t) - 2\left(\frac{v_L}{10}\right)}{2} = 0$$

$$v_L(t) = L\frac{di_L}{dt}$$

$$10i_L + v_L + 5v_L - v_L = 0$$

$$10i_L = -5v_L$$

$$10i_L = -5 \cdot \frac{1}{2}H \cdot \frac{di_L}{dt}$$

$$v = L\frac{di}{dt}$$

$$\int_0^t dt = \int_{i_L(0)}^{i_L(t)} \frac{-5}{20} \cdot \frac{di_L}{i_L}$$

$$(t-0) = -\frac{5}{20} \ln i_L(t) \Big|_{i_L(0^-)}^{t}$$

$$\frac{(t-0)}{-\frac{5}{20}} = \ln i_L(t) - \ln I_L(0^-)$$

$25$

$$-t/\tfrac{5}{20} = \ln \frac{i_L(t)}{25}$$

$5/20 = \frac{1}{4}$

.25 sec

$$e^{-t/\frac{5}{20}} = \frac{i_L(t)}{25}$$

$$e^{-t/5/20}$$

$$v_L = L \cdot \frac{di}{dt} \quad i_L(t) = 25e^{-t/.25\,sec}$$

$$L = \frac{1}{2}$$

$$\boxed{i_L(t) = 25e^{-t/.25\,sec}}$$

$$v_L = \frac{1}{2} .25(-4)e^{-t/.25\,sec}$$

$$\boxed{v_L = -50e^{-t/.25}}$$